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पानी गरमाने के डबाऊ  
हीटर— विशिष्टि  
( पाँचवाँ पुनरीक्षण )

Electric Immersion Water  
Heaters — Specification  
( Fifth Revision )

ICS 13.260;97.100.10



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## FOREWORD

This Indian Standard (Fifth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Electrical Appliances Sectional Committee had been approved by the Electrotechnical Division Council.

This standard covers the safety and performance requirements of electric immersion water heaters. This standard was first published in 1952 and revised in 1963, 1977, 1983 and 1992. During the fourth revision standard, instead of giving details of safety requirements, reference was made to safety standard IS 302-2-201:1992 'Safety of household and similar electrical appliances: Part 2 Particular requirements, Section 201 Electric immersion water heater', published separately. This revision has been undertaken to align the standard with the corresponding safety standard, IS 302-2-201 : 2007.

The details of the safety requirements are covered in IS 302-2-201 : 2007 'Safety of household and similar electrical appliances: Part 2 Particular requirements, Section 201 Electric immersion water heater'.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding of numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

# ELECTRIC IMMERSION WATER HEATERS — SPECIFICATION ( Fifth Revision )

**1 SCOPE**

The standard covers the general safety and performance requirements for ac single phase or dc portable electric immersion water heaters with a flexible cord and connector intended for water heating purposes.

This standard does not cover electric immersion water heaters incorporating thermostat.

**2 REFERENCES**

The following standards are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
302-1 : 2008	Safety of household and similar electrical appliances: Part 1 General requirements
302-2-201 : 2007	Safety of household and similar electrical appliances: Part 2 Particular requirements, Section 201 Electric immersion water heater

**3 TERMINOLOGY**

This clause of IS 302-2-201 is applicable.

**4 GENERAL REQUIREMENT**

This clause of IS 302-2-201 is applicable.

**5 GENERAL NOTES ON TESTS**

This clause of IS 302-2-201 is applicable.

**6 CLASSIFICATION**

This clause of IS 302-2-201 is applicable.

**7 MARKING**

This clause of IS 302-2-201 is applicable.

**8 PROTECTION AGAINST ACCESS TO LIVE PARTS**

This clause of IS 302-2-201 is applicable.

**9 STARTING OF MOTOR OPERATED APPLIANCES**

This clause of IS 302-2-201 is applicable.

**10 POWER INPUT AND CURRENT**

This clause of IS 302-2-201 is applicable.

**11 HEATING**

This clause of IS 302-2-201 is applicable.

**12 OPERATION UNDER OVERLOAD CONDITIONS OF APPLIANCES WITH HEATING ELEMENTS**

**12.1** Appliances with heating elements shall be so designed and constructed that they withstand overloads liable to occur in normal use.

Compliance is checked with the test of **12.2**.

After the test, the appliance shall show no damage within the scope of this standard. In particular, heating wires, internal wiring and the general assembly shall not show deformation such that creepage distances and clearances are reduced below the values specified in **29**. Contacts and connections shall not have worked loose.

**12.2** The appliance is subjected to 15 cycles, each cycle comprising an operating period as specified in **11.7** in accordance with the condition of adequate heat discharge, and a cooling period sufficient to allow the appliance to cool down approximately to room temperature.

Throughout the operating period, the supply voltage being such that the input is 1.27 times the actual input or 1.21 times the actual input plus 12 W, whichever is the greater, for appliances having a rated input exceeding 100 W.

NOTE — Forced cooling may be used for the purpose of shortening the cooling period.

**13 LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE**

This clause of IS 302-2-201 is applicable.

**14 TRANSIENT OVER VOLTAGES**

This clause of IS 302-2-201 is applicable.

**15 MOISTURE RESISTANCE**

This clause of IS 302-2-201 is applicable.

## 16 LEAKAGE CURRENT AND ELECTRIC STRENGTH

This clause of IS 302-2-201 is applicable.

## 17 OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS

This clause of IS 302-2-201 is applicable.

## 18 ENDURANCE

**18.1** Immersion water heater shall be placed in a vessel of appropriate shape containing a quantity of water 2.0 to 2.5 litre/100W rated input, the water being initially cold and the appliance being immersed to the maximum depth of immersion ( up to the maximum safe immersion level in the case of dip in type appliances). The water heater is connected to the supply such that the input is 1.15 times the maximum rated input which is maintained throughout the test. The water heater is operated for 96 h. Suitable amount of cold water is added occasionally to make up for the loss of water.

**18.2** After the test of **18.1**; the water heater shall withstand the electric strength test given

in **16.4** of IS 302-1.

## 19 ABNORMAL OPERATION

This clause of IS 302-2-201 is applicable except as follows:

### Addition:

### 19.101 Test for Thermal Cut-out

If it incorporate a thermal cut out, the immersion water heater shall be connected to rated supply voltage and operated in dry air. Subsequent to an operation of the thermal cut-out, the appliance shall be cooled to room temperature and cut-out reset. This shall constitute one cycle. The appliance shall be subjected to 4 such cycles without burning out of the heating element of the appliance. The appliance shall then satisfactorily withstand the endurance test.

## 20 STABILITY AND MECHANICAL HAZARDS

This clause of IS 302-2-201 is applicable.

## 21 MECHANICAL STRENGTH

This clause of IS 302-2-201 is applicable.

## 22 CONSTRUCTION

This clause of IS 302-2-201 is applicable.

### Additional sub-clause

**22.101** The resistance wire used for the heating element shall be so arranged as to maintain effective

electrical contact with the connecting leads. Connections between the terminals or flexible cord and the element shall be made in a secure and durable manner. All connections and terminals shall be suitably insulated from one another.

**22.102** The heating element shall conform to IS 4159 and shall be completely enclosed in a water-tight metal casing. The metal casing shall be thick enough to offer necessary protection to the filling material. The element shall be located centrally within the casing in such a manner as to prevent any relative movement and/or contact between the element and the casing. At the point where the element emerges from the casing a rigid spacer, bushing or filling shall be provided. The surface of casing shall be treated in such a manner that the casing is preserved from undue corrosion under normal working conditions. The handle, if provided, shall be of a material which has insulating, fire-resisting and moisture-resisting properties.

**22.103** Immersion water heaters of dip-in type shall be provided with a hook or other effective means made of non-ferrous non-corrosive material with a minimum thickness of 0.9 mm to facilitate supporting it on the side of the vessel in which it is to be immersed.

## 23 INTERNAL WIRING

This clause of IS 302-2-201 is applicable.

## 24 COMPONENTS

This clause of IS 302-2-201 is applicable.

## 25 SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS

This clause of IS 302-2-201 is applicable.

## 26 TERMINALS FOR EXTERNAL CONDUCTORS

This clause of IS 302-2-201 is applicable.

## 27 PROVISION FOR EARTHING

This clause of IS 302-2-201 is applicable.

## 28 SCREWS AND CONNECTIONS

This clause of IS 302-2-201 is applicable.

## 29 CLEARANCES, CREEPAGE DISTANCES AND SOLID INSULATION

This clause of IS 302-2-201 is applicable.

## 30 RESISTANCE TO HEAT AND FIRE

This clause of IS 302-2-201 is applicable.

## 31 RESISTANCE TO RUSTING

This clause of IS 302-2-201 is applicable except as follows:

**Addition:**

Ferrous parts, the rusting of which might cause the appliance to fail to comply with this standard, shall be adequately protected against rusting.

Compliance is checked by the following test:

All grease is removed from the parts to be tested by immersion in carbon tetrachloride or trichloroethane for 10 min. The parts are then immersed for 10 min in a 10 percent solution of ammonium chloride in water at a temperature between 15°C and 35°C.

Without drying, but after shaking off any drops, the parts are placed for 10 min in a box containing air having not less than 90 percent RH and temperature between 15°C and 35°C.

After the parts have been dried for 10 min in a heating cabinet at a temperature of  $100 \pm 5^\circ\text{C}$ , their surfaces shall show no signs of rust. Traces of rust on sharp edges and any yellowish film removable by rubbing are ignored.

For small helical springs and the like, and for parts exposed to abrasion, a layer of grease may provide sufficient protection against rusting. Such parts are only subjected to the test if there is doubt about the effectiveness of the grease film, and the test is then made without previous removal of the grease.

The ferrous parts which form a part of the heating element wire shall not be subjected to this test.

**32 RADIATION, TOXICITY AND SIMILAR HAZARDS**

This clause of IS 302-2-201 is applicable.

**101 TESTS**

This clause of IS 302-2-201 is applicable except as follows:

**Table 101 Schedule of Type Tests****Replacement:**

**Table 101 Schedule of Type Tests**  
(Clause 101.1)

SI No. (1)	Tests (2)	Clause Reference (3)
i)	Protection against access to live parts	8
ii)	Power input and current	10
iii)	Heating	11
iv)	Operation under overload conditions of appliances with heating elements	12
v)	Leakage current and electric strength at operating temperature	13
vi)	Transient overvoltage	14
vii)	Moisture resistance	15
viii)	Leakage current and electric strength	16
ix)	Endurance	18
x)	Abnormal operation	19
xi)	Stability and mechanical hazards	20
xii)	Mechanical strength	21
xiii)	Construction	22
xiv)	Internal wiring	23
xv)	Components	24
xvi)	Supply connection and external flexible cord	25
xvii)	Terminals for external conductors	26
xviii)	Provision for earthing	27
xix)	Screws and connections	28
xx)	Clearances, creepage distances and solid insulation	29
xxi)	Resistance to heat and fire	30
xxii)	Resistance to rusting	31
xxiii)	Radiation, toxicity and similar hazards	32

**ANNEXURE**

The annexure of IS 302-2-201 is applicable.



AMENDMENT NO.1 NOVEMBER 1999  
TO  
IS 368: 1992 SPECIFICATION FOR ELECTRIC  
IMMERSION WATER HEATERS

*( Fourth Revision )*

*( Page 2, clause 12.1, first sentence )* - Substitute the following for the existing:

'The tests specified in Table 1 shall constitute the type tests and shall be carried out on one sample of immersion water heater selected preferably at random from a regular production lot.'

*(Page 2, clause 12.1.1, first sentence)* -Substitute the word 'The sample' for 'Both samples'.

(ETD32)

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Reprography Unit, BIS, New Delhi, India

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#### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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